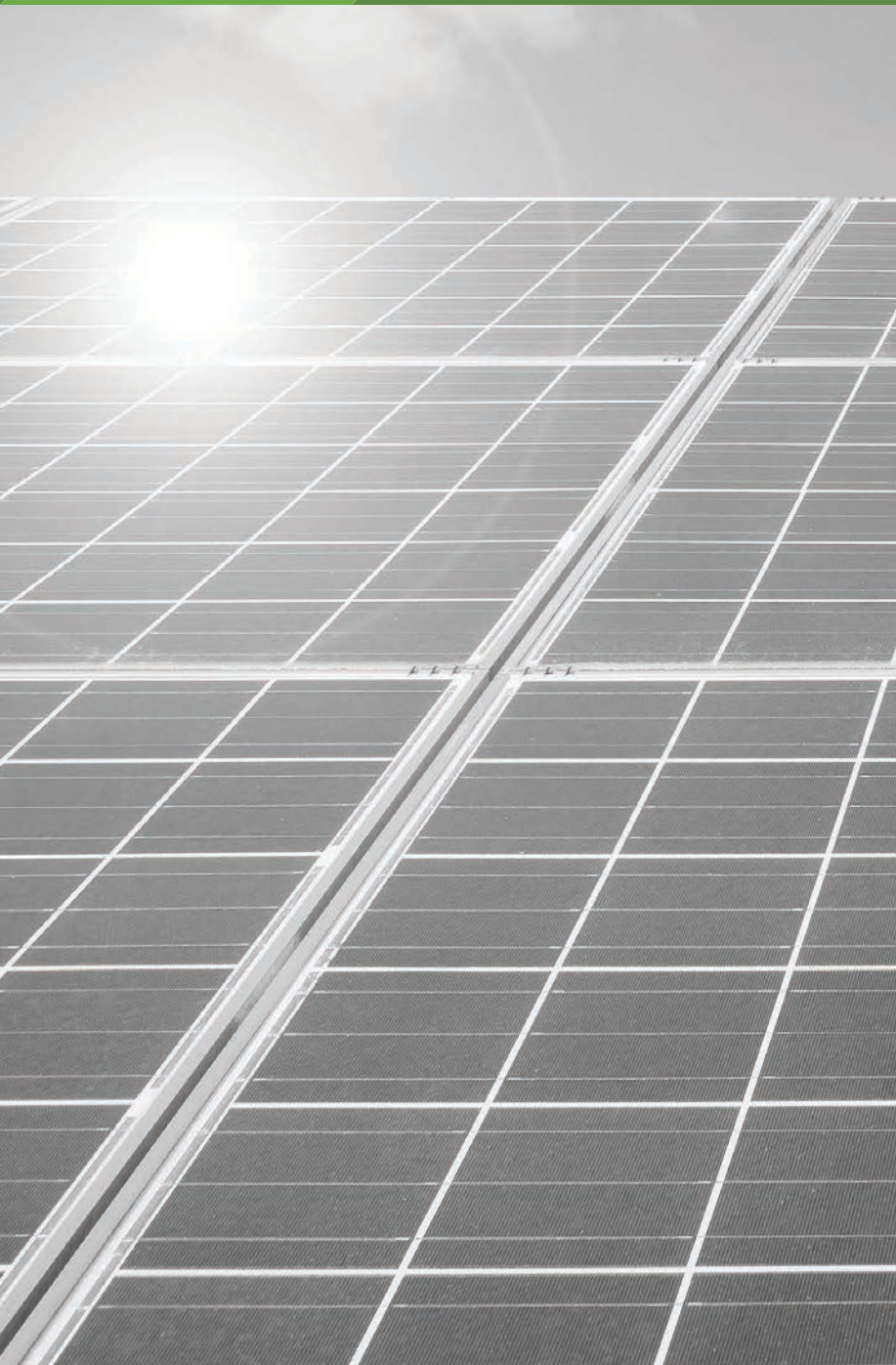


# PINNACLE PLUS+ SERIES SINGLE MAGNETRON POWER SUPPLIES

LOWEST STORED ENERGY, FASTEST ARC RESPONSE, AND WIDEST  
FULL-POWER OPERATIONAL IMPEDANCE RANGE AVAILABLE



#### Input Voltage

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200/208, 400, or 480 VAC (all  $\pm 10\%$ )

#### Output Voltage

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325 to 800 V

#### Efficiency

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>90%  
>87% HALO

#### Power Factor

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>0.95 for loads > 2 kW  
>0.90 at full power for HALO

## Pinnacle Plus+ Series Single Magnetron Power Supplies

The field-proven Pinnacle<sup>®</sup> Plus+ platform of pulsed DC power supplies delivers remarkable process consistency and control for significantly reduced variation and higher yields. This compact, versatile package offers the lowest stored energy, fastest arc response, and widest full-power operational impedance range in the industry. These unprecedented capabilities, combined with superior efficiency and the highest power factor available, deliver process benefits you can bank on.



## Product Highlights

- Lowest operating and installed cost
- Fastest arc response in industry — least arc damage
- Configurable arc response
- Maximum process efficiency
- Precise process control
- Compact, versatile package
- Numerous display/control options
- Safety/emissions compliant
- Lowest stored energy — less than 1 mJ per 1 kW of output
- No tap changes
- 6.25:1 impedance range
- Target conditioning cycle (TCC) — minimizes conditioning time for new targets
- Output repeatability of  $\pm 0.1\%$
- Joule mode — optimized energy delivery
- Programmable limits for output level, strike voltage, and process voltage
- Non-volatile memory storage of settings
- Compact, 3U (128 mm, 5") chassis
- 200 kW of output in a 30U (1280 mm, 50") rack
- CE and CSA marked
- Adjustable frequency range of 5 to 350 kHz
- Synchronous Pulsing



## Fastest Arc Response in Industry — Least Arc Damage

Pinnacle Plus+ series of pulsed DC power supplies store less than 1 mJ per 1 kW of output for the shortest arc recovery time in the industry. With a hard-arc detection time of  $<25 \mu\text{s}$ , they are approximately ten times faster than competing units. Process interruption is negligible. Hard arc shutdown from full power results in power interruption of less than 200  $\mu\text{s}$ .

## Configurable Arc Response

Sophisticated arc-handling capabilities enable you to easily program voltage trip level, delay to shutdown, and shutdown time to match your process. For additional ease, Pinnacle series units automatically implement pre-set process values when you select your target type (metal or nonmetal).

## Maximum Process Efficiency

With the highest efficiency and power factor in the industry, the Pinnacle platform offers both the lowest operating and installed cost.



### No Tap Changes, Wide, Full-Power Tap

Pinnacle units deliver a full-power tap over a 6.25:1 impedance range — without tap changes. Competitive supplies have a gap in coverage with little overlap, and

may only cover a 2.87:1 range by changing among three manual taps.

The standard version of the Pinnacle platform delivers full output into loads requiring 325 to 800 VDC.

### Minimized Conditioning Time for New Targets

Target conditioning cycle (TCC) mode ensures the shortest conditioning time by limiting output power based on arc rate and average power delivered.

### Low-Ripple Technology

The elimination of high-voltage switches and current-diversion circuits results in superior reliability, as well as superior process performance in the form of high output-voltage consistency and a highly accurate, fast ramp response.

## Precise Process Control

A variety of innovative features maximize process control:

Joule mode enables you to set delivered energy during each process run and adjusts for ramp time and lost energy during arc events.

User-selectable and programmable parameters put process control at your fingertips:

- Selectable operation as a power, current, or voltage source
- Programmable ramp/run recipes
- Programmable process limits for output level as well as strike and process voltage

16-bit control circuitry enables the fastest, most accurate ramp-to-set point response in the industry.

Non-volatile memory stores and preserves recent settings in case of an unexpected shutdown.

## Compact, Versatile Package

Pinnacle Plus+ supplies require only 3U for all options of pulsed power supplies. Single-output 1.5 kW, 5 kW, 10 kW units, as well as dual-output 1.5 kW and 5 kW units are available. Flexible master/slaving allows up to 14 units configured together. Any unit is easily designated as either master or slave, making units of the same configuration interchangeable.

## Display/Control Options

The Pinnacle platform offers the following options:

- Active front panel offers complete unit control, with adjustable settings for joule mode, output limits, ramp/run recipes, and arc response.
- Passive front panel. Allows visual monitoring by an operator.
- Multiple I/O protocols. Allow you to adjust settings as with an active remote panel. Analog selections are available in isolated and non-isolated 15- and 24- VDC configurations. Digital selections include AE Bus (RS-232, RS-422, RS-485), Profibus, and DeviceNet™.

## Regulatory Compliance

Pinnacle units are CE marked and conform to Low Voltage Directive 73/23/EEC and Electromagnetic Compatibility Directive 89/366/ EEC — meeting EN55011 (emissions), EN61000-6-2 (immunity), and EN50178 (safety). Select units also carry NRTL certification.

## Product Specifications

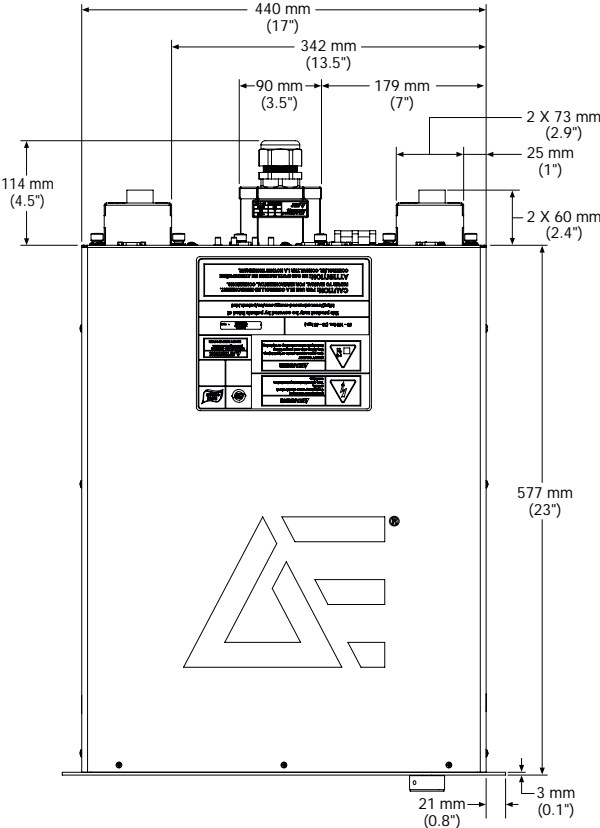
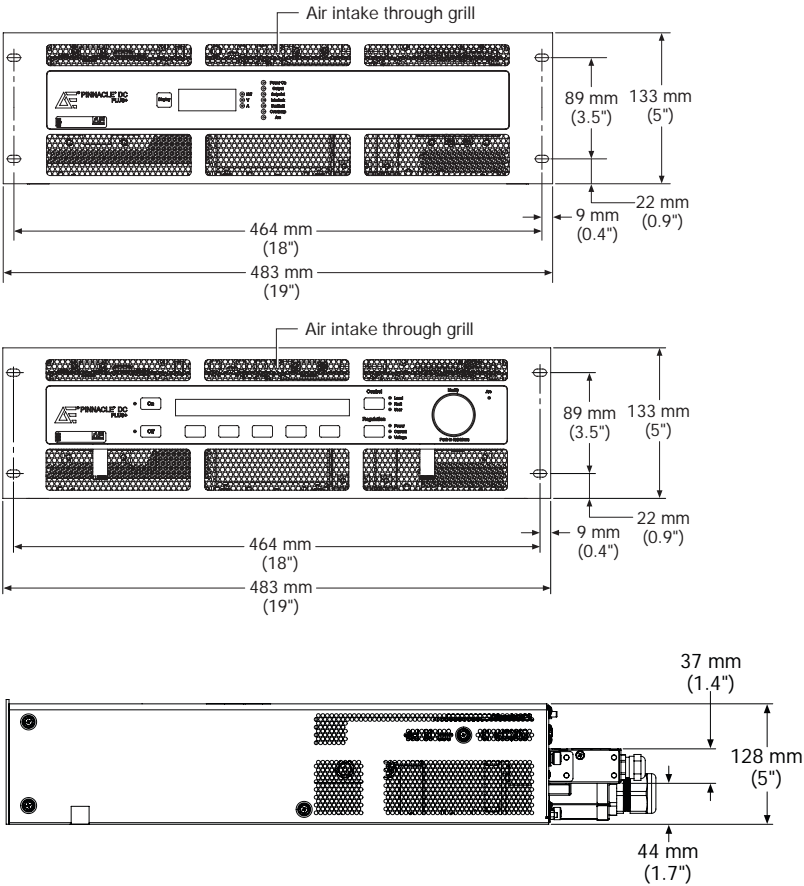
Electrical	
Input Voltage	200/208, 400, or 480 VAC (all $\pm 10\%$ )
	3, 4 wire, 50 to 60 Hz, no neutral required
Efficiency	>90%, >87% HALO
Power Factor	>0.95, >0.90 HALO
Output Voltage	325 to 800 V
Output Polarities	Floating default with positive and negative capability
Output Ripple Voltage	The component of output ripple voltage related to input line frequency is <2% RMS
Output Power Repeatability	0.1% from 10% to 100% of rated power (from run to run at a constant set point)
Remote Panel or Host Port	$\pm 1\%$ of full-rated output
User Port	1% or $\pm 0.2\%$ of full-rated output, whichever is greater
Line Regulation	No accuracy derating for line voltages within the specified input voltage range
Load Regulation	No accuracy derating for impedances within the specified output impedance range
Temperature Coefficient	<0.005%/°C variation in the regulated output parameter over 20° to 40°C (68° to 104°F) ambient temperature range
Product Line (Overall)	Specification accuracy is Cpk <1.5

I/O Control	
Analog Interface Options	37-pin isolated (to 500 VRMS), 0 to 10 VDC analog, 0/24 VDC digital
	37-pin, 0 to 10 VDC analog, 0/15 VDC digital
	37-pin, 0 to 5 VDC analog, 0/15 VDC digital
Serial Communication Options	RS-232, RS-422, RS-485 (selectable baud rates up to 115.2 k): <ul style="list-style-type: none"> <li>· AE Bus protocol</li> <li>· ASCII protocol (MDX and emulation)</li> </ul>
	Profibus (selectable baud rates of 1.5 or 12 MB); AE Bus protocol
	DeviceNet™ option available

# Mechanical Specifications

Construction	
Size (including connectors)	3U: 128 mm (H) x 483 mm (W) x 574 mm (D) (5" (H) x 19" (W) x 22.6" (D))
Weight	21.8 kg (48 lb) to 25.9 kg (57.1 lb)
Output Power Connector	Three-terminal, multi-contact, pluggable connector (with shielded or plastic strain relief), UHF, military, or ring lug
Input Power Connector	The input connector varies from unit to unit. Input connector options include: · 208 VAC units: four-terminal, strip, compression connector · 400 VAC to 480 VAC units: five-terminal, strip, compression connector

## Basic Pinnacle Dimensions (Millimeters/Inches)





For international contact information, visit [advancedenergy.com](http://advancedenergy.com).

[sales.support@aei.com](mailto:sales.support@aei.com)  
+1 970 221 0108

## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

PRECISION | POWER | PERFORMANCE

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